

SE MRC College Algebra Content Review

Exponential and Logarithmic Equations Section 4.4

(Don't forget to look for the logarithmic properties handout.)

Learning Objectives:

1. Use like bases to solve exponential equations.
2. Use logarithms to solve exponential equations.
3. Use the definition of a logarithm to solve logarithmic equations.
4. Use the one-to-one property of logarithms to solve logarithmic equations.
5. Solve applied problems involving exponential and logarithmic equations.

3. Solve the exponential equation by expressing each side as a power of the same base and then equating exponents.

$$8^x = 16$$

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1. Solve the exponential equation by expressing each side as a power of the same base and then equating exponents.

$$7^x = 343$$

The solution set is {_____}.

4. Solve the exponential equation by expressing each side as a power of the same base and then equating exponents.

$$2^{x-9} = \frac{1}{16}$$

The solution set is {_____}.

2. Solve for x.

$$3^{3x-6} = 27$$

The solution set is {_____}.

The solution set is {_____}.

5. Solve the exponential equation by expressing each side as a power of the same base and then equating exponents.

$$4^{x+8} = 32^{x-7}$$

The solution set is {_____}.

6. Solve the exponential equation by expressing each side as a power of the same base and then equating exponents.

$$e^{x+1} = \frac{1}{e}$$

The solution set is {_____}.

7. Solve the following equation. Express the solution set in terms of natural logarithms. Then use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

$$5^x = 22$$

What is the solution in terms of natural logarithms?
The solution set is {_____}.

What is the decimal approximation for the solution?
The solution set is {_____}.

8. Solve the following equation. Express the solution set in terms of natural logarithms. Then use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

$$6e^{4x} = 1860$$

What is the solution in terms of natural logarithms?
The solution set is {_____}.

What is the decimal approximation for the solution?
The solution set is {_____}.

9. Solve the following equation. Express the solution set in terms of natural logarithms. Then use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

$$e^{2-7x} = 306$$

What is the solution in terms of natural logarithms?
The solution set is {_____}.

What is the decimal approximation for the solution?
The solution set is {_____}.

10. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer.

$$\log_6 x = 2$$

The solution set is {_____}.

11. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer.

$$\log_7(x + 3) = 2$$

The solution set is {_____}.

12. Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

$$\log_2(x + 15) = 4$$

The solution set is {_____}.

13. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer.

$$\log_6(x) + \log_6(5x - 1) = 1$$

The solution set is {_____}.

14. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer.

$$\log_4(x + 8) - \log_4(x - 7) = 2$$

The solution set is {_____}.

15. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer.

$$\log_4(x + 11) - \log_4(x - 4) = 2$$

The solution set is {_____}.

16. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer.

$$\log(4x - 4) = \log(x + 3) + \log 5$$

17. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer.

$$\log(x + 10) - \log 2 = \log(5x + 3)$$

The solution set is {_____}.

18. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer.

$$\ln(x - 4) + \ln(x + 1) = \ln(x - 8)$$

The solution set is {_____}.

Answer Key:

1.	3	
2.	3	
3.	$\frac{4}{3}$	
4.	5	
5.	17	
6.	-2	
7.	$\frac{\ln 22}{\ln 5}$	1.92
8.	$\frac{\ln 310}{4}$	1.43
9.	$\frac{2 - \ln 306}{7}$	-0.53
10.	36	
11.	46	
12.	1	
13.	$\frac{6}{5}$	
14.	8	
15.	5	
16.	There is no solution.	
17.	$\frac{4}{9}$	
18.	There is no solution.	